CLAIMS

1. An air bearing slider including:

a slider body having an air bearing surface for aerodynamically supporting the slider body in an operating position in which the air bearing surface is spaced apart from a data surface of a magnetic data reading and recording medium by a nominal flying height;

a magnetic transducer supported with respect to the slider body near the air bearing surface, for movement toward and away from the air bearing surface in response to changes in an operating temperature of the slider body proximate the transducer; and

a transducer spacing ~~control means~~ controller for controlling the operating temperature when the slider body is in the operating position, to adjust a position of the transducer relative to the air bearing surface, thereby to determine a separation distance between the transducer and the data surface independently of the nominal flying height.

2. The slider of claim 1 wherein:

said ~~control means~~ controller includes a resistance heating element mounted to the slider body.

3. The slider of claim 2 wherein:

said transducer is incorporated within a transducing region of the slider having a first thermal expansion coefficient, said slider body is formed of a second material having a second thermal expansion coefficient less than said first thermal expansion coefficient, and the displacement of said transducer is caused by thermal expansion of the transducing region and the slider body at respective and different rates in response to a given increase in temperature.

4. The slider of claim 1 further including:

a thermally expansive material mounted to the slider

body proximate the transducer and forming a thermal expansion region having a higher thermal expansion coefficient than the slider body, and means for applying a bias current to the thermally expansive material, to heat the thermally expansive material and thereby cause the thermally expansive region and adjacent portions of the slider body to expand.

5. The slider of claim 4 wherein:

the transducer is mounted proximate a trailing edge of the slider body, and the thermally expansive region comprises a strip of the thermally expansive material substantially encapsulated within the slider body forwardly of the transducer.

6. The slider of claim 1 wherein:

the ~~control means~~ controller comprises a heating element for generating heat in amounts that vary with an electrical current through the heating element, and a variable current source electrically coupled to the heating element.

7. The slider of claim 6 further including:

a temperature sensing means for sensing said operating temperature and providing a sensing input to the variable current source based on said operating temperature.

8. A magnetic data reading and recording apparatus, including:

a magnetic transducing slider having an air bearing surface, and a transducer positioned near the air bearing surface, and mounted for movement toward and away from the air bearing surface;

a slider support means for aerodynamically supporting the slider proximate a data surface of a magnetic data reading and recording medium with the air bearing surface confronting the data surface and spaced apart from the data surface by a nominal distance;

a temperature sensing means for sensing an operating

temperature of the slider and generating a sensor output based on the operating temperature; and

a transducer positioning means, operably coupled to the sensing means, for controlling a position of the transducer with respect to the air bearing surface responsive to the sensor output.

9. The apparatus of claim 8 wherein:

said ~~control~~ transducer positioning means includes a heating element mounted to the slider for generating heat to displace the transducer relative to the air bearing surface by thermally induced expansion.

10. The apparatus of claim 9 wherein:

said slider has a slider body with a first coefficient of thermal expansion, and said transducer is disposed within a transducing region substantially encapsulated within the slider body and having a second thermal expansion coefficient greater than the first thermal expansion coefficient.

11. The apparatus of claim 10 wherein:

said transducer is mounted to the slider body near a trailing edge thereof, and said heating element comprises an electrically conductive resistance heating element at least partially encapsulated within the slider body proximate the transducer.

12. The apparatus of claim 11 wherein:

said control means comprises a variable current source electrically coupled to the resistance heating element.

13. In a magnetic data reading and recording apparatus including means for aerodynamically supporting a magnetic transducing slider in spaced apart relation to a data surface of a magnetic data reading and recording medium, a process for determining a transducer spacing, including:

supporting a magnetic transducing slider

aerodynamically in spaced apart relation to a data surface of a magnetic data reading and recording medium, with an air bearing surface of the slider confronting the data surface and spaced apart from the data surface by a nominal distance;

while so supporting the slider, measuring a transducer spacing between a transducer supported by the slider and the data surface;

comparing the measured transducer spacing with a desired transducer spacing; and

responsive to a difference between the measured transducer spacing and the desired transducer spacing, changing an operating temperature of the slider to change a distance between the transducer and the air bearing surface while maintaining the slider at said nominal spacing, thereby to displace the transducer toward the desired transducer spacing.

14. The process of claim 13 wherein:

said measuring of the transducer spacing includes measuring at least one of the following:

a transducer signal amplitude, a pulse width, and an acoustic output.

15. The process of claim 13 wherein:

the magnetic transducing slider includes a slider body having a first thermal expansion coefficient, and a transducing region incorporating said transducer and having a second thermal expansive coefficient greater than the first thermal expansion coefficient; and

wherein said changing of the operating temperature includes heating the slider to expand the transducing region and the slider body, with a difference in the rates at which the transducing region and slider body expand increasing a distance by which the transducer protrudes away from the air bearing surface toward the reading and recording surface.

16. The process of claim 13 wherein:

said changing of the operating temperature includes providing an electrical current to a resistive heating element mounted to the slider.

17. The process of claim 13 further including:

sensing said operating temperature, generating sensed temperature values based on the sensed operating temperature, and adjusting the operating temperature based on the sensed values.

18. A process for adjusting a flying height of a transducer mounted to a magnetic head slider while aerodynamically supporting the slider with a reference surface of the slider spaced apart from a data recording surface by a nominal distance, including:

aerodynamically supporting a magnetic transducing slider with respect to a data surface of a magnetic reading and recording medium with a reference surface of the slider spaced apart from the data surface by a nominal distance, and with a magnetic data transducer carried by the slider exposed to confront the data surface while being spaced apart from the data surface;

sensing an operating temperature of the slider and generating temperature values based on the sensed operating temperature; and

responsive to the temperature values, displacing the transducer relative to the reference surface to control a transducer spacing between the transducer and the data surface.

19. The process of claim 18 wherein:

said displacing of the transducer relative to the reference surface is accomplished by heating the slider.

20. The process of claim 18 wherein:

the slider includes a slider body with a first thermal expansion coefficient, and the transducer is mounted within a

transducing region substantially encapsulated within the slider body and having a second thermal expansion coefficient greater than the first thermal expansion coefficient, and wherein the displacing of the transducer includes causing a thermally induced elastic deformation of the slider body and the transducing region.

21. The process of claim 18 wherein:

the displacing of the transducer includes providing a variable electrical current to a resistance heating element mounted to the slider.

22. A magnetic data reading and recording apparatus including:

a magnetic transducing slider including a slider body having a reference surface, and a transducer mounted with respect to the slider body near the reference surface for movement toward and away from the reference surface responsive to changes in an operating temperature of the slider;

a means for aerodynamically supporting the slider in an operating position with the reference surface spaced a nominal distance from a data surface of magnetic data reading and recording medium; and

a transducer spacing control means operatively associated with the slider, for adjusting said operating temperature to displace the transducer with respect to the reference surface, thereby to adjust a spacing between the transducer and the data surface independently of said nominal distance.

23. The apparatus of claim 22 wherein:

said control means is operable in an active state in which the transducer protrudes from the reference surface toward the data surface for a data reading and recording mode, and a passive state in which the transducer is retracted toward the

reference surface corresponding to mode other than data reading and recording.

24. The apparatus of claim 22 further including:

a sensing means for detecting the operating temperature and for generating temperature values based on the operating temperature, wherein the control means is operatively associated with the sensing means to receive the temperature values and adjust the operating temperature based on the temperature values.

25. The apparatus of claim 22 wherein:

said control means includes a resistance heating element mounted to the slider, and a variable electrical current source coupled to the heating element.

26. The apparatus of claim 25 wherein:

said heating element is formed of a material with a thermal expansion coefficient greater than a thermal expansion coefficient of the slider body, is embedded in the slider body proximate the transducer, and expands when heated to elastically deform the slider body and thereby displace the transducer.

27. The apparatus of claim 25 wherein:

the slider includes a slider body having a first thermal expansion coefficient, and a transducing region adjacent the slider body and having a second thermal expansion coefficient greater than the first thermal expansion coefficient; and

said heating element generates heat to expand the transducing region at a different rate than the slider body, thereby displacing the transducer.

28. A process for establishing a transducer flying height for a magnetic transducer carried by an aerodynamic slider body in a magnetic data reading and recording apparatus, including:

while maintaining a magnetic transducing slider aerodynamically supported over a moving magnetic recording medium, measuring a transducer flying height of a magnetic

transducer carried by the slider while maintaining the slider at a first temperature, to obtain a first transducer flying height corresponding to the first temperature;

comparing the first flying height to a predetermined desired flying height;

while aerodynamically supporting the slider, changing the temperature of the slider to a second temperature selected to change a distance between the magnetic transducer and a reference surface of the slider thereby to change the transducer flying height to a second flying height nearer to the predetermined desired flying height; and

storing an indication of the second temperature to a memory in the data reading and recording apparatus, for use in cooperation with a temperature control means to maintain the slider temperature at said second temperature during data and reading recording operations.

29. The process of claim 28 further including:

sensing an ambient temperature of the reading and recording apparatus to generate an ambient temperature reading, and providing the ambient temperature reading as an input to the temperature control means.

30. The process of claim 28 wherein:

said measuring of the first transducer flying height includes generating electrical signals with the transducer and measuring at least one of the following features related to the electrical signals: signal amplitude, signal pulse width at 50 percent peak amplitude, and acoustic energy.

31. The process of claim 28 wherein:

the second transducer flying height is substantially equal to the predetermined desired flying height.